

### REMARKS/ARGUMENT

Claims 1 through 8 are pending in the present application and have been rejected. Claims 1, 3 and 5 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,273,538 (“Mitsubishi”). Claims 2, 4 and 6 were rejected under 35 U.S.C. § 103(a) as being obvious over Mitsubishi in view of U.S. Patent 5,384,583 (“Katerberg”). Claims 7 and 8 were rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 6,334,668 (“Isamoto”) in view of Katerberg.

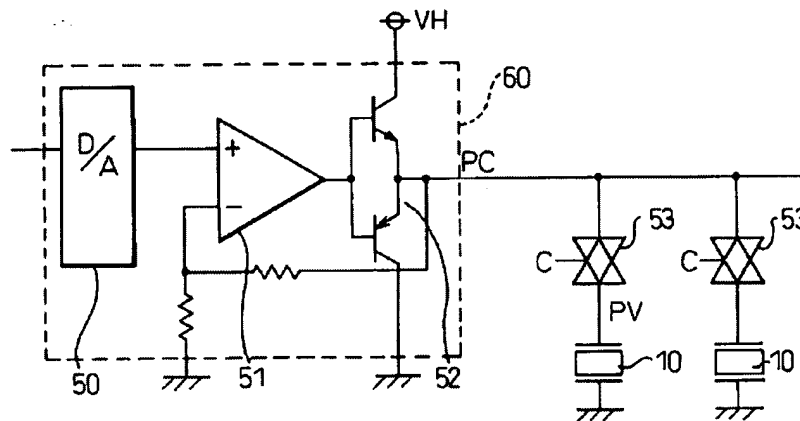
For the reasons set forth below, the Applicant respectfully and earnestly requests reconsideration of the final rejection of claims 1 through 8.

#### I. Rejections Under Section 102(e)

In paragraph 1 of the Office Action, claims 1, 3 and 5 were rejected as being anticipated by Mitsubishi. The Applicant respectfully points out that Mitsubishi does not disclose or suggest each and every limitation of these claims. Specifically, Mitsubishi does not the requirement recited by claims 1 and 3 of “a feedback loop feeding a terminal voltage applied to said piezoelectric actuators back to a second input of said power amplifier.” Furthermore, Mitsubishi fails to disclose the limitation recited by claim 5 of “feeding said amplified drive waveform signal supplied to said piezoelectric actuators back to a second input of said piezoelectric actuators.”

The Applicant made this argument in his response to the previous Office Action, which was filed on September 30, 2002. In response, the present final Office Action asserts that Mitsuhashi shows “the voltage applied to the terminals of the piezoelectric actuators is fed back to the operational amplifier through the resistor in FIG. 5.” As will be explained with reference to FIG. 5 of Mitsuhashi, which is reproduced below, the Applicants respectfully disagree with the Office Action’s characterization of Mitsuhashi.

Fig.5



According to Mitsuhashi, FIG.5 depicts a driving circuit comprising: a driving waveform circuit 60 consisting of a D/A converter 50, an operational amplifier 51, and a current amplifying transistor 52; transfer gates 53; and the piezoelectric actuators 10. In the driving waveform generating circuit 60, first the D/A converter 50 generates the basic

driving voltage waveform which is then current-amplified by the operational amplifier 51 and output from the current amplifying transistor 52.

The common driving waveform PC output from the driving waveform generating circuit 60 is coupled to each transfer gate 53. When the transfer gate is ON, the driving voltage waveform PV is applied to the associated piezoelectric actuator 10 which is thus caused to deform. So PC is the common driving voltage waveform output from the driving voltage waveform generating circuit 60, and PV is the driving voltage waveform applied to the piezoelectric actuator 10 when the transfer gate is ON.

Furthermore, the values of voltages PV and PC are NOT the same. It is well-known that voltage is proportional to resistance. While voltage PC is proportional to the resistance of the line connecting current amplifier 52 and transfer gate 53, voltage PV is proportional to the resistance of the transfer gate 53 and the line connecting transfer gate 53 and piezoelectric actuator 10.

It is clear from FIG.5 of Mitsuhashi that the voltage applied to the terminals of the piezoelectric actuators 10 – which is driving voltage waveform PV – is NOT fed back to the operational amplifier 51, as required by claims 1 and 3. Moreover, FIG.5 fails to show that the driving voltage waveform PV supplied to the piezoelectric actuators 10 is fed back to a second input of the piezoelectric actuators 10, as is required by claim 5.

For these reasons, the Applicants respectfully submit that Mitsuhashi fails to anticipate claims 1, 3 and 5, and earnestly request reconsideration of the final Office Action rejection.

## II. Rejections Under 35 U.S.C. § 103(a)

In paragraph 3, the Office Action rejects claims 2, 4 and 6 as being obvious over Mitsuhashi in view of Katerberg. It is axiomatic that in order to establish a *prima facie* case of obviousness, the Office Action must show that the combination of Mitsuhashi and Katerberg discloses each and every element of claims 2, 4, and 6. The Applicant, however, respectfully submits that the combination of these references does render claims 2, 4, and 6 obvious.

Claims 2 and 4 both depend from, and include all of the limitations of, claims 1 and 3 respectively. As was previously discussed, claim 1 and claim 3 each requires “a feedback loop feeding a terminal voltage applied to said piezoelectric actuators back to a second input of said power amplifier” – a limitation that Mitsuhashi fails to disclose or suggest.

Claim 6 is substantially the method corresponding to claim 3, discussed above. As was discussed with respect to claim 3, Mitsuhashi also fails to disclose or suggest the requirement of claim 6 of “inputting said amplified drive waveform signal supplied to said piezoelectric actuators, and inputting said output signal of said power amplifier to a second

input of said power amplifier.” In Mitsuhashi, the voltage applied to the terminals of the piezoelectric actuators in Mitsuhashi is not fed back to operational amplifier 51 as claim 6 requires. Rather, only the common driving voltage signal output by the current amplifier is fed back to operational amplifier 51.

Katerberg does not cure the deficiencies of Mitsuhashi with respect to claims 2, 4 and 6. Nor did the Office Action cite Katerberg for this purpose. Rather, Katerberg was cited for the purpose of showing additional features recited by claims 2, 4, and 6 that the Office Action states are not present in Mitsuhashi. Whether or not Katerberg actually recites those features, it remains the case that the combination of Mitsuhashi and Katerberg fails to recite each and every limitation of claims 2, 4, and 6. As a result, the Applicant respectfully requests that the rejection of these claims be withdrawn.

### III. Rejections Under 35 U.S.C. § 103(a)

Claims 7 and 8 were rejected under Section 103(a) as being unpatentable over Isamoto in view of Katerberg. The Applicant, however, respectfully submits that the Office Action fails to establish a *prima facie* case of obviousness with respect to claims 7 and 8.

Among the limitations of claim 7 is the requirement of a negative feedback loop including a resistor and a capacitor, said negative feedback loop provided between said power amplifier included in said control circuit board and inputs of said transfer gates

included in said intermediate circuit board. Claim 8, which depends from and includes all the limitations of claim 7, also requires this feedback loop.

The Office Action admits that Isamoto fails to disclose the negative feedback loop provided between the transfer gates on the intermediate circuit board and the power amplifier on the control circuit board as required by each of claims 7 and 8. The Office Action asserts, however, that Katerberg cures Isamoto's deficiency in this regard. The Applicant respectfully disagrees.

As the Applicant has previously pointed out with respect to claims 2, 4 and 6, the only feedback loop disclosed in Katerberg feeds the voltage signals output by piezoelectric elements 12 and 22 back to power amplifiers 28. Katerberg does not show a feedback loop provided between a transfer gate and a power amplifier. In fact, Katerberg does not show a transfer gate at all – in Katerberg, the driving voltage is applied directly to driving piezoelectric elements 18. Moreover, even if one were to assume that the voltage applied to the input of a driving piezoelectric elements 18 would be same as a voltage applied directly to the input of a transfer gate, Katerberg still fails to show a feedback loop provided between the input to the driving piezoelectric elements 18 and the power amplifiers 28 as required by claims 7 and 8.

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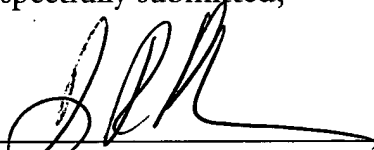
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IV. Conclusion

For the reasons stated above, the Applicant submits that each of pending claims 1 through 8 of the present application is in immediate condition for allowance, and the Applicant respectfully asks that the Examiner reconsider the final rejection of these claims and allow this application to be passed to issue.

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Respectfully submitted,

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